



Malnutrition among Children with Non-syndromic Cleft Lip and Palate: A Case – Control Study in Ile – Ife, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Authors OFB, JKO and AOO designed the study and wrote the protocol. Authors OFB, OSO and FI wrote the first draft of the manuscript and did literature searches. All Authors reviewed the manuscript for important intellectual contribution and approved the final version of the manuscript.

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ABSTRACT

Background: Children with cleft lip and palate (CLP) face lots of difficulties in the society. They tend to suffer malnutrition due to lack of standard care especially from their parents and society at-large. The potential risk of malnutrition is particularly high during early childhood. There is paucity of indigenous data on the prevalence of malnutrition in children with CLP. The aim of the study was to assess the influence of non syndromic CLP on the nutritional status of children.

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Methods: Anthropometric parameters weight for age z score (WAZ), height for age z score (HAZ), weight for height z score (WHZ) of children with CLP were compared with age matched controls.
Results: Prevalence of underweight, wasting and stunting for cleft group were 26%, 18% and 14% respectively compared to 18%, 14% and 10% for the control. Differences in the underweight, wasting and stunting between the two groups were not statistically significant (p value = 0.334, 0.585, and 0.538 respectively). There was significant difference in the bottlefeeding and breastfeeding rates of the two groups. (p= 0.000 and 0.000 respectively).
Conclusion: There is no statistically significant difference in the occurrence of malnutrition in children with non- syndromic Cleft lip and Palate compared with control.

Keywords: Cleft lip and palate; childhood malnutrition; Ile –Ife; Nigeria.

1. INTRODUCTION

The presence of Cleft lip and palate (CLP) or Cleft palate (CP) only in a child may adversely affect his or her nutritional status if special precautions are not taken. Objective assessment and convincing evidence can however strengthen the resolve of parents to be more dutiful in feeding these children with special needs. It has been observed that most mothers prior to the delivery of the child intend breastfeeding their babies but may have to adopt bottle-feeding following medical advice [1]. The quality of this advice can be improved by our knowledge of the discrepancies in the nutritional status of afflicted children compared with normal children. Moreover difficulties in mother – child interactions such as lack of satisfactory breastfeeding, willful neglect and sometimes abandonment occasioned by the presence of the cleft have been found to be responsible for the impairment in cognitive development observed in children who had late cleft repair [2]. This trend can be reversed if the effect of cleft on nutritional status is known and appropriate interventions given to facilitate early surgical repair.

This study was conducted with the aim of ascertaining the effect of Cleft and feeding practices in infancy on the nutritional status of children born with non syndromic cleft deformity when compared with suitably matched non – cleft children. This will allow us to be guided by scientific evidence when offering recommendations that will enhance the practice of early cleft repair.

2. PARTICIPANTS AND METHODS

This is a hospital based study that was carried out over twelve months from July 1 2007 to June 30, 2008 in the Plastic Surgery Unit of Obafemi Awolowo University Teaching Hospital, Ile – Ife, Nigeria. Ethical approval was obtained from the

Ethics and Research Committee of the Obafemi Awolowo University Teaching Hospital, Ile – Ife with IRB/IEC number 00005422 and Protocol number ERC/2007/03/17.

The sample size was estimated using a statistical formula for comparison of two groups: $n = 1/(1-f) \times [2x(Z\alpha + Z\beta)^2 \times P \times (1-P)] / (P_0 - P_1)$ where n is Minimum sample size, f is correction factor (estimated non response rate) and was taken as 10% i.e 0.1, $Z\alpha$ is the computed statistical figure obtained from Table of $Z\alpha$ statistics for level of significance, α taken as 0.05 in this study. $Z\alpha = 1.65$. $Z\beta$ is the computed statistical standard figure for type 11 error probability. From the Table of $Z\beta$, the value was taken as 0.84. P_0 is the proportion of participants in control to exhibit outcome of interest (estimated prevalence of 54% was taken based on an earlier report by Esimai et al.) [3]. P_1 is the proportion of participants in the cleft group expected to exhibit outcome of interest. This was taken as 30%. (Montagnoli et al. [4] reported up to 30% reduction in the nutrition parameters of cleft children). This brings the sample size to 50.

Fifty children with non syndromic cleft lip ± palate or cleft palate only were recruited consecutively from the Cleft Clinic pre operatively while fifty healthy non cleft children were also recruited as controls from the Infant and Under 5 Welfare Clinic of the Teaching Hospital. All children recruited into the study were aged 3months to five years in both the Cleft and the Control groups. The children were screened for suitability for inclusion into the study and informed consent obtained from the parents. While consecutive recruitment of the Cleft group was done, the Control group was however selected by simple random sampling technique. Data on demography, socioeconomic status and feeding practices were obtained using researcher facilitated structured questionnaire. The pattern of Cleft was described using Kernahan and Stark

classification. Anthropometric measurements of weight and height were measured according to the standard method and the raw data converted to nutritional indicators of weight for age, height for age, and weight for height using the Epi-Nut module in Epi-info programme and their deviation scores (Z scores) from the National Centre for Health Statistics/World Health Organization (NCHS/WHO) reference figures were obtained from this programme. A child was classified as underweight, wasted or stunted if the weight for age Z score(WAZ), weight for height Z score(WHZ) and height for age Z score(HAZ) was equal to or below the minus two standard deviation (-2SD) of this reference international standard respectively.

The performance of children in the Cleft group was compared to their non cleft counterpart to find out the impact of cleft on the children nutritional status.

2.1 Data Analysis

The data analysis was by descriptive and inferential statistics using the Epi-info 2002 and the Statistical Package for Social Scientist (SPSS) version 15.0. Univariate analysis was carried out for all major variables of interest: demographic, socioeconomic and feeding practices to obtain their frequency. Student's t-test was used to test the significance of difference between mean values. Bivariate analysis using Pearson's Chi Square (X^2) was used to compare categorical variables for significance of difference in the Cleft and Control groups. A probability (p) value of less than 0.05 was set as level of significance.

3. RESULTS

A total of one hundred children were studied consisting of fifty subjects (children with cleft deformity) and fifty controls. Three children with cleft lip and palate and associated pan-systolic murmur were seen and excluded. The age range for the Cleft group is 3 to 60 months with a mean of 16.84 ± 17.01 while for the Control group, the age ranges from 3 to 54 months with a mean of 18 ± 50.13 . Age and gender distribution of the study population is shown in the (Tables 1 and 2).

Table 1. Age - frequency table of the cleft and control populations

Age (months)	Frequency		Percentage (%)	
	Cleft	Control	Cleft	Control
3-12	28	25	56	50
13-24	10	12	20	24
>24	12	13	24	26
Total	50	50	100	100

Table 2. Sex-frequency table of the cleft and control populations

Sex	Frequency		Percentage (%)	
	Cleft	Control	Cleft	Control
Male	20	26	40	52
Female	30	24	60	48
Total	50	50	100	100

The epidemiological and socioeconomic variables of the two groups were similar (Tables 3 and 4).

Table 3. Comparison of the epidemiological features of the study population

Parameters	Cleft	Control	Statistical significance
Age –range	3 – 60 (mths)	3 – 54 (mths)	t = -0.531
Mean (\pm SD)	16.84 ± 17.01	18 ± 50.13	df = 98
			p – value = 0.597 NS
Ethnic groups			
Yoruba	44 (88%)	45 (90%)	Fisher's exact P = 0.319
Hausa	1 (2%)	-	
Igbo	-	2 (4%)	
Others	5 (10%)	3 (6%)	
Total	50 (100%)	50 (100%)	
Birth order			
1	19 (38%)	16 (32%)	Fisher's exact P = 0.822
2	9 (18%)	18 (36%)	
3	14 (28%)	13 (26%)	
> 3	8 (16%)	3 (6%)	
Total	50 (100%)	50 (100%)	

df = degree of freedom, (Figures in parentheses are percentages of the total), NS = Not significant {Significant at $p < 0.05$ }

Table 4. Socioeconomic status of the study population using Oyedeji's classification of social class as modified by Temiye et al. [5]

Socioeconomic status	Cleft (%)	Control (%)
I	2 (4)	7 (14)
II	10 (20)	10 (20)
IIIN	21 (42)	19 (38)
IIIM	9 (18)	7 (14)
IV	7 (14)	6 (12)
V	1 (2)	1 (2)
Total	50 (100)	50 (100)

Fisher's exact P = 0.368 (No significant difference)

With respect to the feeding practices during infancy between the two groups, significant differences were found in the practice of breastfeeding ($p=0.000$) and bottle - feeding with infant formula ($p = 0.000$) (Table 5).

Some mothers adopted more than one feeding practice.

Distribution of the cleft children studied showed an even distribution for the unilateral cleft of the primary palate while children with combined primary and secondary palate had the combined cleft more on the left side (Table 6).

The prevalence of malnutrition using the nutritional indicators; underweight, wasting, and stunting is shown in (Table 7). The prevalences of acute malnutrition manifested as underweight

and wasting were higher in the Cleft group (26%, 18%) than the Control group (18%, 14%) but was not statistically significant ($p= 0.334$, $p= 0.585$). The prevalence of stunting was equally higher in the Cleft group (14%) than the Control group (10%) but the difference was not significant ($p= 0.538$).

4. DISCUSSION

The results of this study showed that the prevalences of underweight (26%) and wasting (18%) in the cleft group was higher than those obtained from a suitably matched control group (underweight-18%, wasting-14%). The difference was however not statistically significant ($p = 0.334$). This result is in agreement with the findings of Barakati and Alkofide [6] in their work on growth status of Saudi patients with Cleft lip and palate.

The underweight prevalence in the cleft group is similar to a prevalence of 30.5% reported from a large series study in South Africa [7]. A difference of 16.8% reduction in underweight prevalence between the cleft group and a similar control group reported in the above study is twice the difference of 8% reduction in the underweight prevalence between the cleft and the control groups of this study. This may perhaps reflect the difference in the age- group studied as over 90% of the cleft population in the above mentioned South African study are infants in whom the nutritional effects of cleft are most marked.

Table 5. Feeding practices of the study population during infancy

Feeding practice	Cleft	Control	Statistical significance
Breast milk feeding - -direct			
yes	29 (58%)	46 (92%)	Fisher's exact P = 0.000
no	21 (42%)	4 (8%)	
Breast milk via feeding bottle			
yes	7 (14%)	3 (6%)	Fisher's exact P = 0.182, NS
no	43 (86%)	47 (94%)	
Breast milk via spoon			
Yes	12 (24%)	9 (18.0%)	$X^2 = 0.542$, df = 1, P = 0.461 NS
no	38 (76%)	41 (82%)	
Infant formula via feeding bottle			
Yes	26 (52%)	7 (14%)	$X^2 = 16.327$, df = 1, P = 0.000 S
no	24 (48%)	43 (86%)	
Infant formula via spoon			
Yes	11 (22%)	13 (26%)	$X^2 = 0.219$, df = 1, P = 0.640 NS
no	39 (78%)	37 (74%)	

NS = Not significant; S=significant {p <0.05}

The prevalences of underweight and wasting found in the cleft group in this study are similar to the national figure for Nigerian children of 27% underweight and 12% wasting [8].

Table 6. Distribution of the cleft deformities studied

Types of cleft	Frequency	Percentage (%)
1° palate only		
Right	11	22
Left	11	22
Bilateral	1	2
Total	23	46
1° and 2° palate		
Right	6	12
Left	7	14
Bilateral	1	2
Total	18	36
2° palate only		
Hard and soft	4	8
Hard palate only	-	-
Soft palate only	5	10
Total	9	18
Grand total	50	100

The prevalence of stunting was also found to be higher in the cleft group (14%) compared to the control group (10%), although not statistically significant, $p = 0.538$. While the values for both groups are much lower than the national figure for Nigerian children of 46% [8], they are comparable to a prevalence of stunting of 27% reported in a study on the nutritional status of primary school children in this environment [9]. The lower prevalence of stunting found in both groups compared to the above study may however be partly explained by the fact that the

prevalence of stunting in the first year of life is low but increases with age [10,11]. On the other hand, the population in this study belonged to a lower age-group (3 months-5 years; pre-school children) with half of both the cleft and the control populations in their infancy (56% for the cleft group, 50% for the control group). Stunting is generally associated with low socioeconomic status [12] and this may also be responsible for the increasing prevalence of stunting with age in our environment.

Some of the feeding practices show a significant difference between the two groups with a lower prevalence of direct breastfeeding ($p=0.000$), and a higher prevalence of bottle-feeding with infant formula ($p=0.000$) in the cleft group compared with the control. These findings confirmed the benefit of bottle-feeding with infant formula in children with the cleft deformity in whom breastfeeding may not satisfactorily deliver sufficient nutrient to the child. Ahmad Khaleghnejad Tabari et al. [13] also reported that most mothers of cleft children will ultimately resort to bottle-feeding with formula after unsatisfactory outcome with breastfeeding. They noted that special bottles were used by 69.5% (41) of the cleft children studied, out of which 85% (34) of the bottle-fed cleft children were cured of their nutritional problems. In our study, 52% of the mothers of cleft children also adopted bottle-feeding with formula which again reinforced the preference of bottle-feeding as the preferred feeding method for cleft children. Furthermore, bottlefeeding with breastmilk was observed not to be popular with mothers of children in the cleft group. This may be due to the difficulty of lactation usually experienced by mothers of poorly sucking cleft children. Fifty-four per cent of the cleft group in this study had either combined cleft of the primary and secondary palate or cleft of the secondary palate only with accompanying difficulty in developing sufficient negative intra oral pressure for effective breastfeeding. The prevalence of malnutrition

Table 7. Nutritional status of the study population using WAZ, HAZ, WHZ

Nutritional status	WAZ (underweight)		HAZ (stunting)		WHZ (wasting)	
	Control	Cleft	Control	Cleft	Control	Cleft
Normal	41 (82%)	37 (74%)	45 (90%)	43 (86%)	43 (86%)	41 (82%)
Malnourished	9 (18%)	13 (26%)	5 (10%)	7 (14%)	7 (14%)	9 (18%)
Total	50 (100%)	50 (100%)	50 (100%)	50 (100%)	50 (100%)	50 (100%)
Statistical significance	$X^2 = 0.932, df = 1, p=0.334$		$X^2 = 0.379, df = 1, p= 0.538$		$X^2 = 0.298, df=1, p= 0.585$	

WAZ – Weight for Age Z score, HAZ – Height for Age Z score, WHZ – Weight for Height Z score

has been reported to be significantly higher in this group compared with children with cleft of the primary palate only [4,14]. The adoption of bottle-feeding with infant formula by fifty-two per cent of the cleft group may partly explain why no significant difference was found in the prevalence of malnutrition between the cleft and the control groups. The limitations of this study include our inability to specifically evaluate the relative contribution of each type of cleft as well as the impact of the width of the cleft on the nutritional status. Longitudinal observation of the difference in the nutritional status between the two groups was not possible due to the constraint of the period available for this study. Further studies are however necessary to address these areas of limitations.

5. CONCLUSION

The prevalences of underweight, wasting and stunting in children with non-syndromic cleft lip ± palate or cleft palate only were clinically higher although not statistically significantly different when compared to that of a suitably matched control. Children with cleft deformity however had a lower prevalence of breastfeeding but a higher prevalence of bottlefeeding with infant formula which may account for the comparable prevalences of malnutrition between the two groups. Despite the limitations of this study, children born with cleft lip and palate are subject of discrimination by the society and this puts them at great disadvantage. Hence, they tend to suffer malnutrition due to the lack of quality care especially from their parents and society at-large. This study is a contribution addressing malnutrition and has shown that bottle feeding with infant formula ameliorated malnutrition in children with CLP.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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